1.1 PROJECT LOCATION AND STATUS

The project under consideration is SR-26 (also referred to as Riverdale Road) in Weber County, Utah. Riverdale Road begins at SR-126 (also referred to as 1900 West) in Roy, Utah, and continues in a northeast direction for a distance of approximately 3.7 miles through the cities of Roy, Riverdale, South Ogden, and Ogden to US-89 (also referred to as Washington Boulevard) in Ogden, Utah. The project study area includes the Riverdale Road corridor between 1900 West and Washington Boulevard. The study area varies in width depending on the resource being studied. Figures 1.1, 1.2, and 1.3 show the location of the project and surrounding streets.

Funding for the project is based on the section of Riverdale Road from I-15 to Washington Boulevard and is from both state and federal sources. Since the project involves two federal highways (I-15 and I-84) and federal funding is involved, the requirements of the National Environmental Policy Act (NEPA) apply to the project. The Federal Highway Administration (FHWA) is the lead federal agency and the Utah Department of Transportation (UDOT) is the project sponsor and the lead state agency.

The logical termini, or limits, for the project are 1900 West and Washington Boulevard based on the following factors:

- **The ends of the project must connect to other major roadways and the project must be of sufficient length to reasonably address environmental issues.** The project connects to 1900 West on the west and to Washington Boulevard on the east; both are major roadways and these limits encompass all of Riverdale Road.
- **The project must have independent utility, meaning that the proposed project does not rely on other projects being implemented.** Riverdale Road improvements will not rely on other projects.
- **The project will not restrict other transportation projects being considered currently or in the reasonably foreseeable future.** This project is listed in the Wasatch Front Regional Council's (WFRC) Long-Range Transportation Plan (LRTP) and is therefore compatible with other projects in the area.

Improvements to relieve congestion along Riverdale Road date back to September 1979. These improvements, implemented over the years, have consisted primarily of left-turn signal phasing changes at several traffic signals, the addition of right- and left-turn bays, and additional traffic signals as development permitted.

In 1999, Ogden City completed reconstruction of 36th Street in the vicinity of Riverdale Road. In 2000, UDOT completed the construction of a new bridge over the Weber River and the Union Pacific Railroad (UPRR) tracks. In 2001, Riverdale Road was overlaid with a plant mix seal coat with minor rotomilling at the lip of the gutter and at the major intersections. In 2002, a traffic signal was installed at the intersection of Riverdale Road and 900 West.

Additionally, several maintenance items were performed on the Riverdale Road/I-15 overpass bridge including patching potholes, placing a waterproofing membrane and asphalt overlay on the bridge deck, reconstructing the bridge parapets, repairing joints, sealing concrete columns, painting bearing units, and repairing one bent cap. The work on the I-15 bridge and roadway overlay were designed to extend the life of Riverdale Road until the appropriate long-term improvements to Riverdale Road could be implemented.

1.2 ESTABLISHING PROJECT PURPOSE AND NEED

The purpose and need for a federal governmental action considers why the project is needed and establishes the reasoning and justification for the development of alternatives. The project purpose and need not only addresses the immediate problems associated with the roadway but also identifies what the needs will be 20 years in the future. To establish the purpose and need for this project, the following items were investigated and evaluated:

- **System Linkage:** How does this roadway relate to other roadways in the area and how important is it in terms of the entire roadway system or network?
- **Capacity/Transportation Demands:** Is the roadway capable of handling the existing and projected traffic volume without causing the traveling public and other users to wait in congestion for an excessive amount of time?
- **Legislative Demands:** Is the project mandated by political action at the city, county, state, or federal level?
- **Social Demands and Economic Development:** Is there an overwhelming demand for improvement to the roadway by the public or are there economic consequences to the area if the roadway is not improved (that is, are people avoiding shopping in the area because of the condition of the roadway or the amount of time it takes to use the road because of too much traffic on the roadway)?
- **Modal Interrelationships:** Does the roadway provide a key relationship between different modes of transportation such as bus, train, bicycle, etc.?
- **Safety:** Is there a high number of accidents occurring along the roadway?
- **Roadway Deficiencies:** Are there physical elements of the roadway, such as the pavement or bridges, in need of repair?

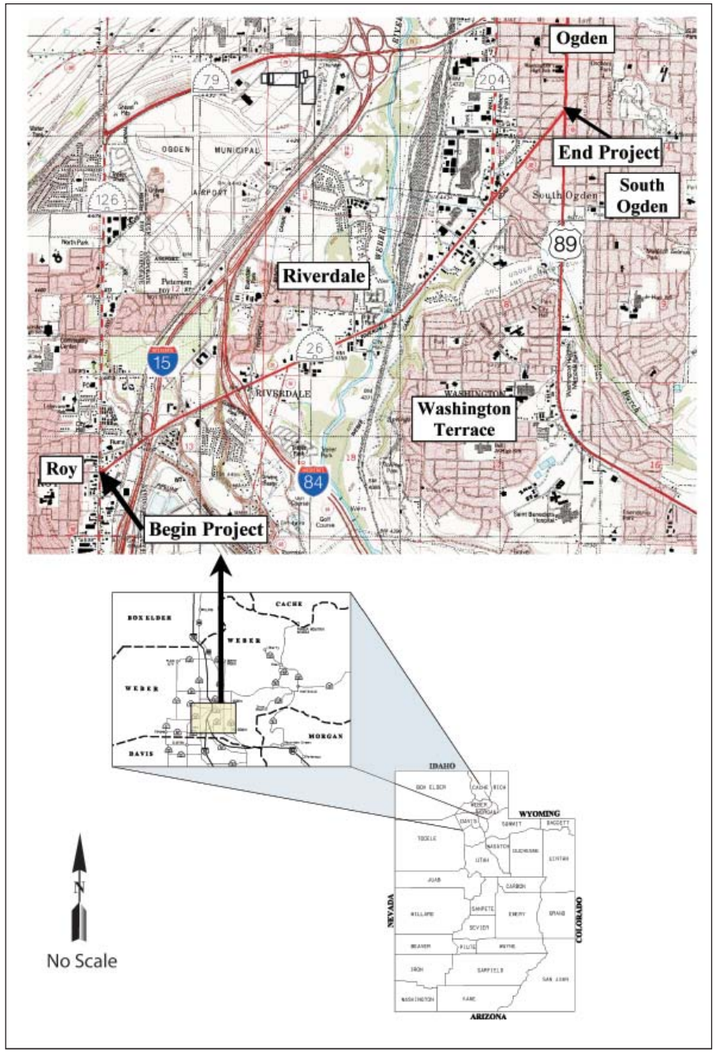
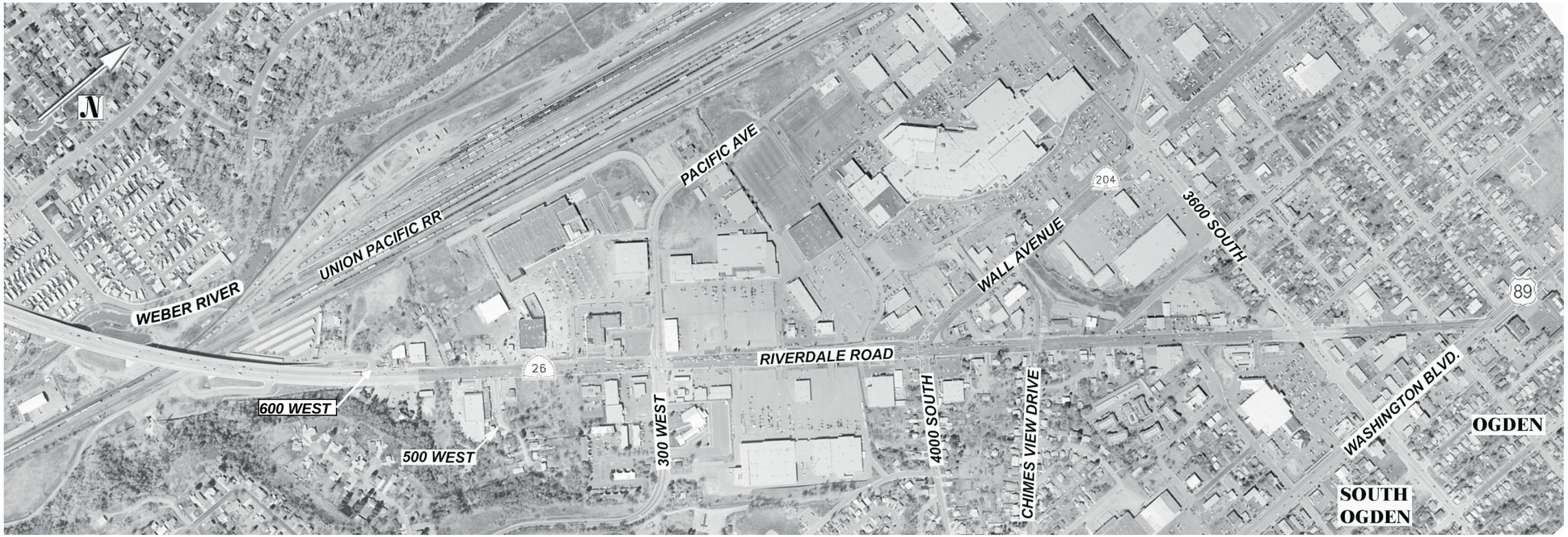


Figure 1.1–Project Study Area.

Figure 1.2–Streets within the Project Area West of Weber River.



Approx. Scale: 1" = 700'

700' 0' 700' 1400' 2100'

Figure 1.3–Streets within the Project Area East of Weber River.

Public input, agency input, research, field investigations, and technical analyses were used to establish the purpose and need for this project. At the beginning of the project, information was gathered regarding the number and type of accidents that occurred along Riverdale Road. Existing traffic volumes were also obtained. Master development and transportation plans were obtained from the cities along the corridor and WFRC to identify potential roadway improvements needed to accommodate future planned growth. A meeting was held with the different cities, agencies, and the public to obtain input about the perceived problems along Riverdale Road. Using this information, technical studies were performed to verify the extent of the existing problems. The following sections describe the results of the analyses that were performed.

1.2.1 System Linkage

To evaluate the importance of Riverdale Road to the transportation network, the layout and function of the street network was evaluated along with the transportation master plans obtained from the cities and WFRC.

A transportation network consists of a series of connecting roadways, each serving a different purpose. Roadways are classified based on the function they serve in the network. The function of local roadways is to provide direct access to adjacent properties. Local roadways connect to collector roads. Collector roads provide some access and some through traffic. Collector roads connect to arterials. The main function of an arterial is to move traffic from point A to point B with limited access to adjacent properties. Expressways provide for traffic movement with very limited access but intersect other roadways at grade. Freeways provide for traffic movement with no direct access to adjacent properties. Freeways do not intersect other roadways at grade. Interchanges provide access to freeways.

Riverdale Road is an integral part of the local transportation network system, as shown in Figure 1.1. Riverdale Road, which is classified as an arterial, serves the greater Ogden area and suburban areas south and west of Riverdale Road, as well as downtown Ogden. Several collector and local roads and freeways and other arterials connect to Riverdale Road between Washington Boulevard and 1900 West. Riverdale Road also provides direct access to local retail and commercial services.

The arterial street system in the Ogden area generally follows a grid of north-south and east-west streets. North-south arterial streets that connect to Riverdale Road include SR-126 (1900 West), SR-204 (Wall Avenue), and US-89. East-west arterial streets in the area have direct access to I-15 and include 30th Street, 31st Street, 24th Street, and 12th Street in Ogden as well as 5600 South in Roy. Riverdale Road is an exception to the north-south and east-west arterial street grid pattern as it is on a diagonal from southwest to northeast.

Riverdale Road connects to I-15 and I-84. I-15 is a major north-south freeway for travel between Ogden, Provo, and Salt Lake City. Riverdale Road has limited connections to I-15 with only an I-15 northbound to Riverdale Road eastbound off ramp and a westbound Riverdale Road to southbound I-15 on ramp.

I-84 is a freeway that serves as a major link between I-15 and Interstate 80 (I-80). There is a standard diamond interchange connecting I-84 and Riverdale Road that provides for all traffic movements.

The I-15/I-84 interchange connects the two freeways approximately 2 miles north of Riverdale Road. This interchange provides for the southbound I-15 to eastbound I-84 and the westbound I-84 to northbound I-15 traffic movements. Riverdale Road accommodates the northbound I-15 to eastbound I-84 and westbound I-84 to southbound I-15 traffic movements.

Maintaining Riverdale Road in a safe operating condition is vital to the transportation network. Riverdale Road's function to provide for through traffic, interstate linkage, and connecting local retail and commercial services with suburban areas and downtown Ogden makes Riverdale Road a prominent feature in the local transportation system. The capacity, safety, and condition of Riverdale Road need to be improved in order for Riverdale Road to continue to adequately function as a viable part of the transportation network.

1.2.2 Capacity/Transportation Demands

People want to travel along a roadway without interference from other vehicles and stoplights. As traffic along a roadway increases, the number of conflicts with other vehicles and the possibility of needing to stop more frequently will increase. Since it is impossible to provide enough roadways to allow everyone to travel where they want without interference, a certain level of congestion or delay is acceptable. The amount of congestion that is acceptable varies based on the area. In downtown Ogden, a higher level of congestion is acceptable than in the outskirts of the Ogden area.

For urban roadways with signals, the congestion is governed by the capacity of the signalized intersections. The roadway between the signals becomes congested because traffic backs up at the signals. Adding additional turn lanes, changing signal timing, and adding through lanes improves the capacity of signalized intersections. When through lanes are added, they must be extended before and after the intersection at a sufficient distance, typically 0.5 mile, otherwise drivers tend to avoid using them because of the difficulties associated with merging back into the other lanes.

To determine if the amount of congestion warrants improvements to a roadway, an analysis is performed using existing and projected traffic volumes. For this project, year 2030 traffic volumes were used to represent future conditions. The traffic modeling used to project future 2030 traffic volumes for Riverdale Road followed a three-step process, consistent with similar projects. The first step determines the extent of congestion that exists on Riverdale Road by determining existing traffic volumes using automated traffic counts and by manually counting vehicles at the intersections. The second step forecasts future traffic volumes. The third step consists of traffic analysis based on the projected traffic numbers to determine the extent of congestion or delay time that the traveling public will encounter.

The WFRC LRTP provides planners with an estimate of the comprehensive regional travel demands in the future. The plan addresses all modes of transportation and identifies needed transportation improvements over the entire region from Brigham City at the north end to the south end of the Salt Lake Valley. It represents a financially constrained plan of highway and transit improvements envisioned over the next 30 years.

The WFRC travel model uses projected land use and the existing and projected future transportation network to estimate the volume of traffic in the future. For purposes of estimating traffic, different land use types, such as residential or commercial, create an estimated certain number of trips. By identifying the projected land use and transportation network based on city and county master plans, it is possible to estimate the number of trips generated. The number of trips is then used to estimate the number of vehicles on each of the roadways in the network.

Changes to the WFRC model and input data were made based on information gathered specifically for this analysis. The basic model scripts, inputs, parameters, etc., were not changed.

The first change consisted of updating the land use model input. Representatives from each city in the corridor were contacted individually to discuss the future land use shown in the model. Based on the input from each city, the land use input values were changed as needed.

The second change consisted of adjusting the roadway configuration of the transportation network model based on the different alternatives considered. As alternatives were suggested, the traffic model was revised to determine whether the traffic numbers would remain the same or change. Some changes in traffic volumes were noted, but the changes

were within the range of accuracy of the model. Therefore, the projected traffic volumes could be used in refined traffic analysis regardless of the alternative being analyzed.

The WFRC travel model in use at the beginning of 2002 was used to estimate future traffic volumes.[1] Table 1.1 shows the existing and projected No-Action traffic volumes on Riverdale Road. Riverdale Road is one of the most highly traveled non-freeway routes in Utah. Traffic volumes on Riverdale Road have grown over the past several years and are expected to increase by more than 60% by 2030 in some locations due to the growth in population and housing. Volumes are anticipated to grow by 38% over the entire study area by 2030. The general commuting pattern in the area is from the residential areas primarily to the south and west to the commercial areas generally in Riverdale and Ogden. Riverdale Road's function to provide for through traffic, interstate linkage, and business access has created traffic congestion problems and safety concerns.

Table 1.1–Average Annual Daily Traffic Volumes on Riverdale Road.

Year	1900 West to I-15	I-15 to I-84	I-84 to 1050 West	1050 West to Wall Avenue	Wall Avenue to Washington Boulevard
1996	23,345	26,270	36,310	40,110	16,260
1998	22,704	25,550	35,315	42,090	16,650
2000	25,415	28,750	39,733	45,180	17,875
2001	25,585	28,940	40,000	45,480	17,995
Projected 2030 No-Action	33,400	48,000	53,100	57,300	25,900
Percent Increase (2001–2030)	31%	66%	33%	26%	44%

As traffic increases, the level of congestion that is already evident in the study area is expected to increase. To calculate the existing and estimated year 2030 congestion, the traffic volumes projected by the WFRC model were converted to peak-hour[2] volumes. Figures 1.4 and 1.5 show the PM (afternoon) peak-hour traffic volumes for the existing traffic conditions and 2030 No-Action Alternatives, respectively. Using these values, a traffic analysis was performed on each of the signalized intersections using Synchro signal analysis software. Synchro requires manual input of traffic volumes, intersection geometry, and traffic signal control assumptions and produces an estimate of the amount of congestion consistent with the nationally recognized methods outlined in the 2000 Highway Capacity Manual. Synchro was also used to provide a visual simulation of the traffic flows for presentation at public and agency meetings.

The extent of congestion along a roadway is designated as a level of service (LOS) ranging from A to F as shown in Figure 1.6. Table 1.2 and 1.3 provide a description of the level of service ranges.

Table 1.2–Individual Signalized Intersection LOS.

LOS	Control Delay (Seconds/Vehicle)
A	0 – 10
B	> 10 – 20
C	> 20 – 35
D	> 35 – 55
E	> 55 – 80
F	> 80

Source: 2000 Highway Capacity Manual

Table 1.3–Undivided Multilane Suburban Highway/Arterial LOS.

LOS	Traffic Conditions
A	Free-flow operations at average travel speeds; vehicles are unimpeded in maneuvering within traffic stream.
B	Relatively unimpeded at average travel speeds; only slightly restricted maneuvering within traffic stream.
C	Relatively stable traffic operations; more restricted maneuvering at mid-block locations than LOS B; individual cycle failures at traffic signals may begin to appear.
D	Small increases in traffic flow may cause substantial delay and decrease in travel speed; congestion and individual cycle failures at traffic signals are more noticeable as vehicles stop.
E	Poor travel speeds with slow progression and high delay; individual cycle failures at traffic signals occur frequently.
F	Extremely slow travel speeds with queues forming behind breakdowns; brief periods of movement are followed by long periods of no vehicle movement.

Source: 2000 Highway Capacity Manual

On roadways where there are multiple signals, drivers want to be able to drive through a series of signals without stopping or stopping only for a short time. The ability to provide a coordinated system of signals is complicated by signal spacing and signal cycle lengths. As signal spacing decreases, lower speeds and shorter signal cycle lengths are needed to provide proper signal coordination with little or no delay. Inconsistent spacing and various traffic volumes on the cross streets and major streets increase the problem of providing a free flow of traffic through the series of traffic signals. The National Cooperative Highway Research Program (NCHRP) Report No. 420, Impacts of Access Management Techniques, suggests that for every traffic signal added to a mile of highway, the average progressive travel speeds along the highway decrease by 2.5 miles per hour (mph).

As traffic volumes have increased, the community pressure to install additional traffic signals along Riverdale Road has also increased. An agreement was signed between UDOT and Riverdale City on July 30, 2001, identifying the locations of existing and future traffic signals along the 3-mile stretch of Riverdale Road within Riverdale city limits. The agreement identifies nine traffic signals consisting of the eight existing signals at 1500 West, I-84 eastbound, I-84 westbound, 1050 West, 900 West, 700 West, 300 West, and the ShopKo entrance and a future signal at 500 West. The signals along Riverdale Road have been coordinated to allow a reasonable flow of traffic along Riverdale Road without causing undue delay to cross-street traffic.

Table 1.4 on page 1.8 identifies the existing and projected 2030 No-Action Alternative LOS at traffic signals along Riverdale Road during the PM peak hour. The existing LOS on Riverdale Road at any individual intersection is generally at an acceptable LOS B or C. However, the combination of multiple traffic signals at close and non-uniform spacing has resulted in very poor progression.

The projected LOS is based on the signals being set to maximize the number of vehicles that can go through several signals without stopping in addition to optimizing each individual signal. This is technically referred to as optimized for a combination of progression and individual signal LOS. The same signal cycle length was used for every signal allowing for progression but not consistent progression.

Different cycle lengths at each signal resulted in a marginal reduction in delay at each signal (generally the same LOS) and an increase in delay due to progression through multiple signals.

[1] The modeling results presented are consistent with the latest WFRC model version (released Version 4.2 and Beta Version 4.3, July 2005). The Riverdale Shopping Center Expansion Traffic Impact Study, dated August 5, 2005, validates the traffic data for this project. At the intersection location at 300 West, an LOS D was determined which is the same level of service at this same location in Tables 1.4 and 1.8.

[2] Peak hour is defined as the hour of the day that has the highest volume of traffic. For Riverdale Road, the peak hour is a "typical weekday" between 5 PM and 6 PM.

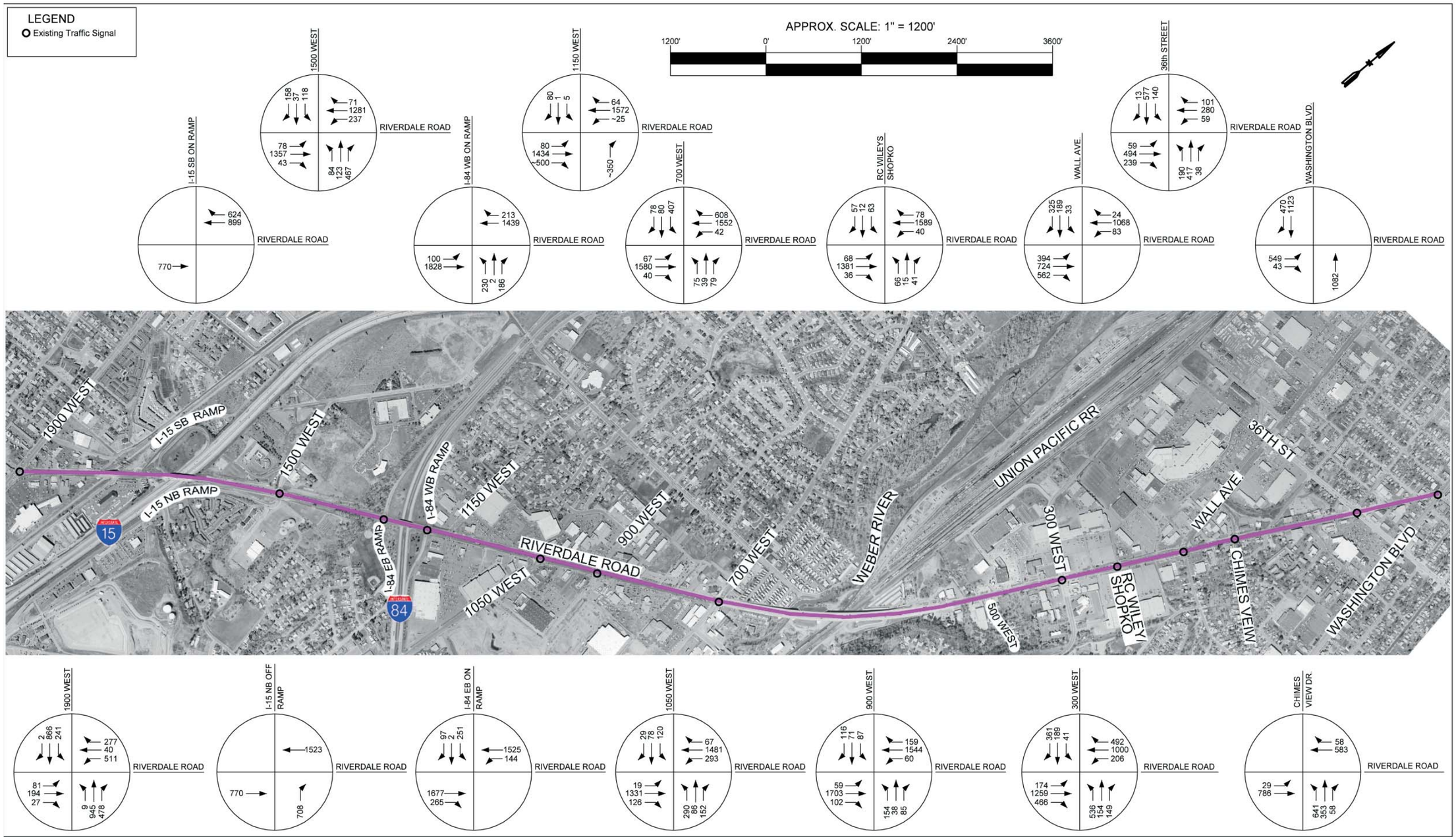


Figure 1.4–2002 PM Peak-Hour Traffic Volumes.

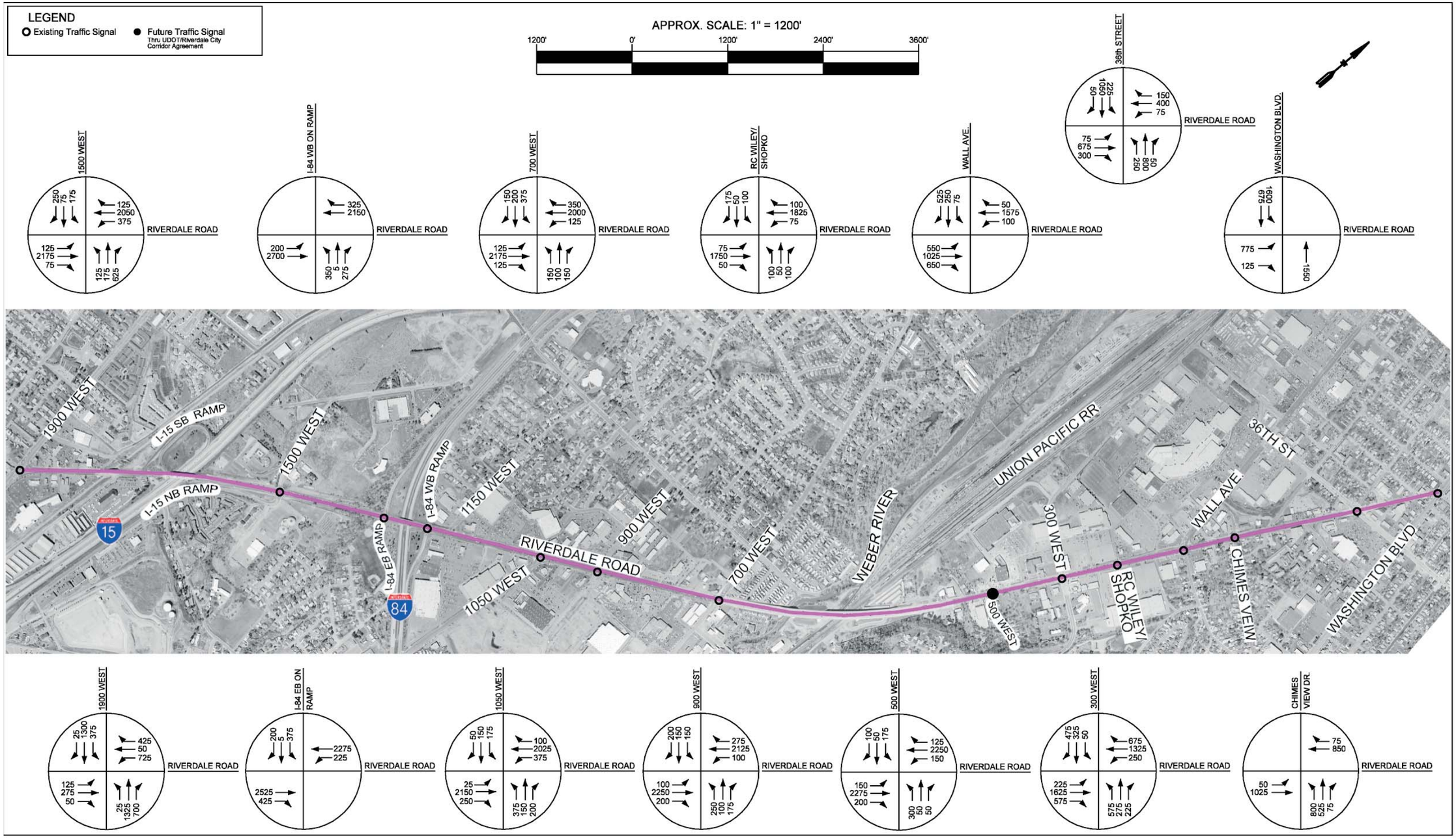


Figure 1.5–2030 PM Peak-Hour Traffic Volumes for the No-Action Alternative.

Table 1.4–Existing and 2030 No-Action LOS.

Intersection Location with Riverdale Road	Existing Peak Hour LOS	2030 No-Action Peak Hour LOS
1900 West (SR-126)	C	F
1500 West	C	F
I-84 Eastbound Ramp	B	D
I-84 Westbound Ramp	A	C
1050 West (SR-60)	C	F
900 West	B	D
700 West	B	E
500 West	NA[a]	F
300 West	D	F
RC Willey/ShopKo	A	B
40th Street/Wall Avenue (SR-204)	D	D
Chimes View Drive	B	C
36th Street	B	D
Washington Boulevard (US-89)	C	D
Eastbound Arterial LOS Summary (LOS/Speed)	**D/19.5 mph**	**F/11.3 mph**
Westbound Arterial LOS Summary (LOS/Speed)	**C/22.2 mph**	**E/15.3 mph**

[a] Currently there is no signal at 500 West.

The existing total delay to vehicles along Riverdale Road, due to the progression through multiple signals, is approximately 8.5 minutes per vehicle (mpv). This delay is expected to increase to 22.8 mpv in the year 2030 if no improvements to Riverdale Road are made.

Riverdale Road is operating roughly at an overall LOS D. The perceived level of congestion is much worse because of the number of traffic signals. As traffic volumes increase, congestion will grow and the LOS will worsen. Without improvements, six intersections are projected to be at LOS E or worse by 2030. The overall LOS will be LOS E for the urban street corridor. WFRC uses LOS D as the planning goal for projects in their LRTP. American Association of State Highway and Transportation Officials (AASHTO) guidelines recommend providing the highest LOS practical for a given location. Due to the heavily developed, urban conditions of Riverdale Road, an LOS D is appropriate as the highest LOS practical for the corridor. Therefore, LOS D is the design objective for this project.

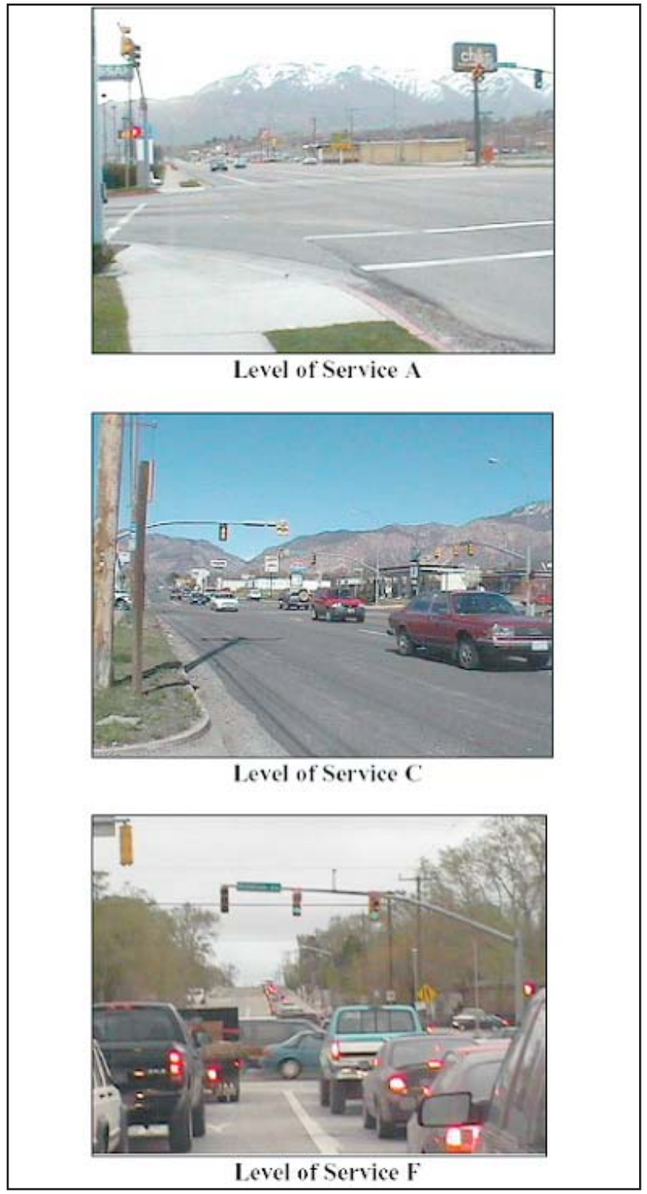


Figure 1.6–Illustrations of Level of Service.

1.2.3 Legislative Demands

Projects are often initiated or mandated by political or public pressure. In some instances, state or federal legislation will dictate that a project be completed. Information obtained from UDOT and WFRC determined that the following legislative actions are driving the need for this project.

In January 2002, UDOT initiated this project as a result of legislation that established the Utah Highway Centennial Fund (Centennial Fund). The Centennial Fund was established to ensure that specific projects within Utah are constructed. The list of projects to be funded was established by the legislature based on input from UDOT, the cities, and county agencies. Projects were identified based on perceived capacity and safety improvement needs, roadway deficiency needs, and roadway geometric issues. The legislation that created the Centennial Fund mandates that improvements to Riverdale Road be considered.

Capacity improvements to Riverdale Road are identified in the WFRC LRTP adopted in January 2002. Other proposed major transportation improvements identified in the LRTP affecting the Ogden area include widening I-15 through Weber County, improving US-89 through Davis County, implementing commuter rail from Salt Lake City to Brigham City, and widening 300 West south of Riverdale Road. Based on the WFRC model, capacity improvements are needed to Riverdale Road.

The project is listed on the STIP for fiscal years 2005 to 2009. The current funds are Centennial Funds, Federal Interstate Maintenance Funds, and Federal Bridge Replacement Funds. The Utah state legislature appropriates Centennial Funds for the reconstruction of specific highway projects. Interstate Maintenance Funds are used for resurfacing, restoration, and rehabilitation as well as reconstruction of the Interstate Highway System. Bridge Replacement Funds are used for rehabilitation or reconstruction of bridges. Based on the condition of the roadway, improvements are needed. The sufficiency rating of 47 out of 100 for the I-15 bridge makes it eligible for Bridge Replacement Funds.

1.2.4 Social Demands and Economic Development

The population and employment in Weber County are projected to grow over the next 30 years by 62% and 75%, respectively, as shown in Table 1.5. Much of the overall growth in Weber County is projected to occur in the rural areas on the north and west sides of the county. Population growth within the study area is expected to be moderate. Riverdale, Roy, South Ogden, and Ogden are projected to grow by 24%, 44%, 62%, and 38%, respectively.

Table 1.5–Socioeconomic Changes 2000–2030, Weber County.

Factor	Year 2000	Year 2030	Percent Increase
Population	196,533	319,274	62%
Employment	111,374	194,663	75%

Overall employment growth in the study area and the county is expected to be stronger than the overall population growth. In Riverdale, the 24% increase in population by 2030 would be accompanied by a 100% or more increase in employment. Similar triple-digit employment growth rates are projected in Roy and South Ogden, with moderate employment growth projected in Ogden. Much of the employment growth in the study area is projected as retail services, large discount retail, automobile dealerships, restaurants, and other commercial businesses.

The commercial and population growth anticipated for the area support the projected traffic volumes. Traffic congestion along Riverdale Road, specifically the length of time to cross the roadway and the difficulty of making left turns, is a major concern of residents in the area. As determined by discussions with the cities and public in the area, the existing congestion along Riverdale Road is causing problems in the community. Several people stated that they avoid shopping along Riverdale Road because of the congestion. For the area to remain economically viable, the congestion, safety, and roadway deficiency problems along Riverdale Road must be addressed. The cities are attempting to address the problem through planned growth but stated that improvements are needed to Riverdale Road.

1.2.5 Modal Interrelationships

Modal interrelationships are based on the ability of different modes of transportation such as roadways, airports, and mass transit services to interface with and complement each other as part of an integrated system. As improvements to roadways are considered, it is important to address how the improvements will assist in accommodating these other modes of transportation and how the roadway facility interacts with these other modes.

The Ogden Airport is located north of Riverdale Road west of I-15. Public access to the airport is from SR-79. Though Riverdale Road has no direct connection to the airport, 1750 West connects to Riverdale Road and is used by residents to access the airport. No proposed improvements to 1750 West or to the airport are planned that would impact Riverdale Road.

A project is planned to connect Salt Lake City to Ogden and eventually Brigham City via commuter rail. In anticipation of the project, Ogden constructed an Intermodal Center at 23rd Street and Wall Avenue. The Intermodal Center will include a park-and-ride lot that will link rail, bus, and passenger vehicles. Riverdale Road, via Wall Avenue, provides a direct route to the Intermodal Center for local residents.

Bus service presently exists along Riverdale Road. The WFRC regional travel model includes continuation and expansion of bus service to provide up to four separate routes on Riverdale Road.

Currently there are no on-street or off-street bicycle paths along Riverdale Road and none are planned for the future. There is an existing bicycle path along the Weber River that crosses under Riverdale Road.

For the other modes of transportation to continue to be effective, Riverdale Road needs to be effective. For Riverdale Road to provide satisfactory access to other modes of transportation, capacity, safety, and roadway deficiency improvements are needed.

Figure 1.7 shows the modal interrelationships near Riverdale Road.

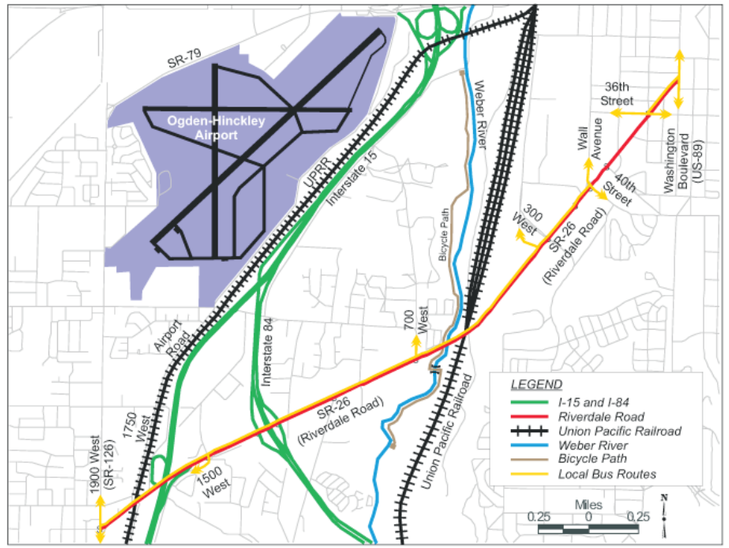


Figure 1.7–Modal Map.

1.2.6 Safety

Accident statistics are typically reported as a running 3-year period. Accident data were collected for Riverdale Road for the 3-year periods of 1998 to 2000 and 2002 to 2004.

Accident rates on Riverdale Road for the years 1998 to 2000, compared to the statewide average accident rates, are shown in Table 1.6. State data are based on the functional classification of the route (principal arterial), the size of the service area of the road (urban areas above 250,000 people), and the traffic volume on the route (which varies by segment but generally averages about 35,000 cars per day). Accident rates on Riverdale Road fell below the statewide average rates in some areas and exceeded them in other areas. In particular, the accident rate between I-84 and 1050 West was much higher than the state average for similar roadways. However, the overall accident rate along Riverdale Road was below the statewide average rate for this 3-year period.

Table 1.6–Riverdale Road Traffic 1998 to 2000 Accident Rates.

Segment	Riverdale Road	State Average
1900 West to I-15	3.41	5.26
I-15 to I-84	8.57	6.85
I-84 to 1050 West	13.56	5.70
1050 West to 700 West	5.28	6.53
700 West to 300 West	3.44	6.53
300 West to Chimes View Drive	8.21	4.89
Chimes View Drive to 3600 South	6.76	4.89
3600 South to Washington Boulevard	4.43	4.89
Riverdale Road (Weighted) Total	**6.21**	**6.85**

In the 3-year period from 1998 to 2000, there were 893 total accidents along Riverdale Road or an average of 298 accidents per year. Accident types and the percentages of total accidents on Riverdale Road are shown in Table 1.7. Fifty-six percent of the rear-end-type collisions were within 150 feet of an intersection. Sixty-four percent of the left-turn-type accidents occurred at intersections. Over this period, 1.5 percent of the total accidents involved pedestrians and bicycle riders. These accidents generally occurred at intersections and during the late evenings.

Table 1.7–Accident Data.

Type of Crash	2002 (% Total)	2003 (% Total)	2004 (% Total)	Average 1998–2000 (% Total)	Average 2002–2004 (% Total)
Number of Crashes	413	337	281	298	344
Crash Rate	8.62	6.99	5.83	6.21/6.85[a]	7.15/5.29[a]
Severity Rate	1.50	1.55	1.61	1.53/1.67[a]	1.55/1.60[a]
Rear-End Crashes	189 (45.8%)	258 (76.6%)	144 (51.2%)	137 (46.0%)	197 (57.3%)
Left-Turn Crashes	75 (18.2%)	39 (11.6%)	54 (19.2%)	89 (29.9%)	56 (16.3%)
Right-Angle Crashes	46 (11.1%)	36 (10.7%)	47 (16.7%)	21 (7.0%)	43 (12.5%)

[a] Actual average rate / expected average rate

Comparable accident data for each of the time periods collected are shown in Table 1.7. For 2002 to 2004, the number of accidents and the accident rate increased compared to 1998 to 2000. The percentage of right-angle accidents and rear-end accidents increased, whereas left-turn accidents decreased. The overall accident rate increased to the point where Riverdale Road had a higher-than-average accident rate. However, the statewide average accident rate dropped (6.85 compared to 5.29) in the corresponding years. The accident severity is below the statewide average rate. The majority of the accidents continue to be rear-end collisions. This type of accident can be attributed to poor signal timing and progression, numerous accesses, and increasing traffic volumes.

Multiple high-volume access points create the opportunity for more traffic accidents. Traffic accidents are often the result of providing too many or too frequent driver decisions such as those that arise from conflicting traffic movements associated with traffic turning onto and off of the roadway. Traffic signals can often increase traffic accidents since they offer an additional driver decision point. However, traffic signals offer some control that can reduce the number and severity of traffic accidents at high-accident locations.

In particular, the area from I-84 to 1050 West is a problem area for safety. The unsignalized full-movement access point at 1150 West has been identified as a safety concern. The increase in recent years in the number of accidents and the accident rate well above the statewide average demonstrates the need to make safety improvements to this segment of Riverdale Road.

1.2.7 Roadway Deficiencies

Evaluations of the existing pavement were done in 2000 prior to the chip seal that was placed on the roadway in 2002. The chip seal in 2002 has not performed well and so does not change the conclusions of the pavement evaluation done prior to the overlay. The pavement evaluations use an International Ride Index (IRI), as shown in Table 1.8, to rate the overall condition of the roadway pavement. Roads with an IRI higher than 100 are identified as roads that need immediate pavement work.

Table 1.8–International Ride Index.

Index Range	Meaning
45 and Below	Very Good Ride
45–70	Good Ride
70–100	Fair
100–135	Poor Ride
135 and Higher	Very Poor Ride

Riverdale Road has an IRI ranging from 92 to 119, which indicates that the pavement is in fair to poor condition. There is extensive pavement cracking throughout the project area. The cracking indicates that the pavement is suffering from the effects of aging at the surface and throughout the pavement section, including the subgrade below the pavement. The existing pavement is expected to last about 3 to 4 more years before there are major problems with potholing. Pavement rehabilitation is needed to maintain the serviceability of Riverdale Road.

Currently the shoulders along Riverdale Road vary from nonexistent to 10 feet wide. Shoulders are needed to allow room to park disabled vehicles and to provide a place for stockpiling snow from snow removal operations.

Sufficiency ratings represent the overall structural and geometric condition of a bridge and are used to prioritize bridge rehabilitation work. A high sufficiency rating indicates that a bridge is in good condition, whereas a low sufficiency rating indicates the need to replace or rehabilitate a bridge. A sufficiency rating below 50 qualifies a bridge for Federal Bridge Replacement Funds.

The Riverdale Road/I-15 bridge has a bridge sufficiency rating of 47. The low sufficiency rating is based on the condition of the deck, beams, columns, foundations, deck geometry, and clearance under the bridge. The repair work to the bridge in 2002 did not affect the bridge sufficiency rating because the repairs were designed only to prolong the usefulness of the bridge.

The Riverdale Road/I-84 bridge has a bridge sufficiency rating of 77. The sufficiency rating is based on its deck condition, the clearances under the bridge, and the deck geometry. The inspection report for this structure indicates that the bridge deck should be rehabilitated or replaced.

The other bridges along Riverdale Road have bridge sufficiency ratings greater than 80.

Based on the low sufficiency rating, there is a need to rehabilitate or replace the Riverdale Road/I-15 bridge. The rating of the I-84 bridge shows that there is a need to rehabilitate or replace the bridge deck.

1.3 PROJECT PURPOSE AND NEED

The purpose of the proposed project is based on the needs of the Riverdale Road corridor as described in the previous sections. The need for improvements is based on current and future traffic demand, traffic patterns, and roadway deficiencies. The elements of the purpose and need are summarized in Figure 1.8.

Congestion management is needed to meet the projected travel demand in the design year. Without improvements, six of the corridor intersections are projected to operate at an LOS E or worse by the year 2030 with an unacceptable overall LOS E for the urban corridor.

The area from I-84 to 1050 West has been identified as a high-accident area with an accident rate well above the statewide average. Safety improvements need to be made to this segment of Riverdale Road. To meet the purpose and need for the proposed Riverdale Road project, the project solution will address the following objectives:

- **Reduce Congestion –** Meet design-year travel demand.
- **Improve Safety –** Enhance design elements to reduce the potential for accidents at high-accident locations along the corridor.
- **Improve Roadway Deficiencies** – Rehabilitate or replace existing substandard pavement and rehabilitate or replace the I-15 bridge and I-84 bridge deck to meet appropriate structural sufficiency standards.

1.4 CONCLUSIONS

Riverdale Road is part of the total transportation network for the area. It provides for through traffic and connects local retail and commercial services with suburban areas and downtown Ogden. Riverdale Road provides a link for through traffic between major roads, freeways, and other modes of transportation. Traffic volumes continue to increase and congestion continues to get worse along Riverdale Road. As the traffic volumes and congestion increase, the number of accidents is also increasing. The existing pavement is in poor condition and the bridges at I-15 and I-84 are in need of repair.

For Riverdale Road to continue to be a viable element of the transportation system it must meet the social, economic, and capacity/transportation demands placed on it. To meet these demands, the roadway and bridges must be repaired, the roadway must be improved to reduce accident potential, and the congestion must be managed. Legislative action and past and future projects support the need to improve the roadway.

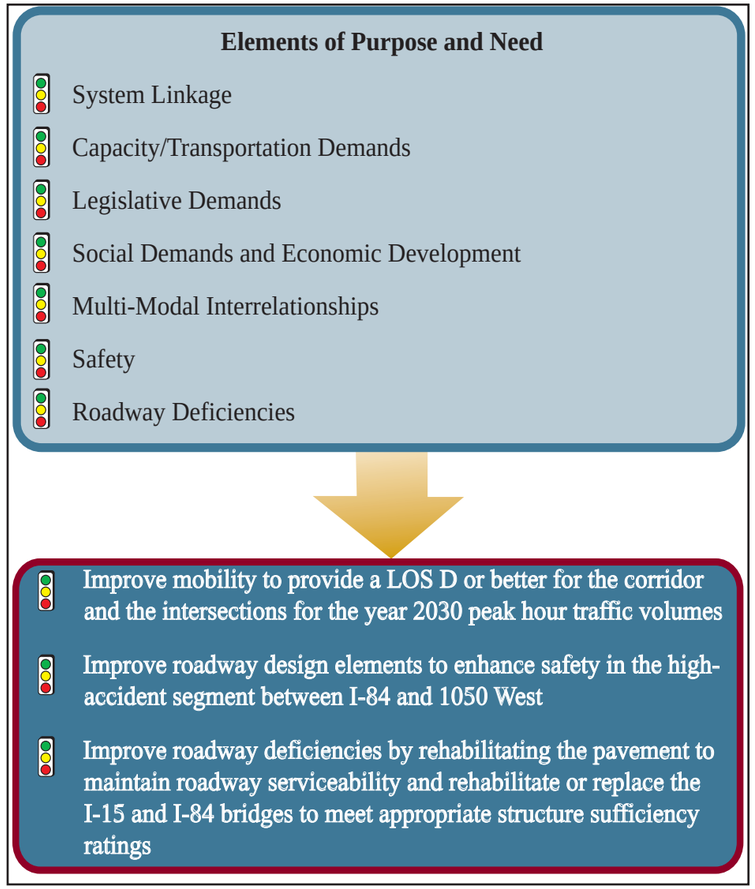


Figure 1.8–Purpose and Need for Action.

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